MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The REVIEW for December, 1896, is based on 2,748 reports from stations occupied by regular and voluntary observers, classified as follows: 137 from Weather Bureau stations; 33 from post surgeons, received through the Surgeon General, U. S. Army; 2,435 from voluntary observers; 96 received through the Southern Pacific Railway Company; 14 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 33 from Canadian stations; 1 from Hawaii; 30 from Mexican stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

The first half of the month was characterized by rather more than the usual amount of clear sky and pleasant weather; the latter half had the usual average number of storms, which mostly passed along the borders of our territory, leaving the month as a whole characterized by pleasant weather except in Washington and Oregon. The temperatures were generally above the normal, and the accumulated temperatures continued to show a large excess in the Rocky Mountain Plateau Region, the Lake Region, the Gulf States, and the intermediate districts. The precipitation was in excess in Washington and Oregon, but deficient in the Middle Atlantic and New England States.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressures* during the current month were high in the Rocky Mountain Plateau Region, the southern portion of the Appalachian range, and the Gulf States generally. They were low at the extreme northern border of our weather map and lowest from the State of Washington westward and from Newfoundland eastward.

The highest pressures were: In Canada, Ottawa, 30.21; Kingston and Port Stanley, 30.18; Toronto and White River, 30.17; Montreal, 30.16: in the United States, Idaho Falls, 30.32; Salt Lake City, 30.31; Chattanooga, 30.29; Lander and Knoxville, 30.28; Parkersburg, Lynchburg, and Atlanta, 30.26.

The lowest were: In Canada, St. Johns, N. F., 29.82; Prince Albert, 29.90; Calgary, 29.91; Victoria, 29.92; Edmonston, 29.95; Medicine Hat and Sydney, 29.96: in the United States, Tatoosh Island, 29.91; Fort Canby, 29.95; Seattle, 29.97; Havre, 29.99.

As compared with the normal for December, the mean pressure was in excess in the Lake Region and New England and to a less extent in the Rocky Mountain Region and Gulf States. It was deficient in the Missouri Valley, Washington, Oregon, and the northwestern Canadian Provinces. The greatest excesses were: at Canadian stations, Kingston, Halifax, Montreal, and Saugeen, 0.13; Rockliffe and White River, 0.12; Quebec, Toronto, Port Stanley, and Parry Sound, 0.11: in the United States, Northfield and Buffalo, 0.13; Oswego, Albany, Erie, Toledo, Detroit, Sault Ste. Marie, and Green Bay, 0.12. The greatest deficits were: Canada, Calgary, 0.21; Medicine Hat, 0.14; Swift Current, 0.13: United States, Havre, 0,16; Miles City, 0.12; Rapid City, 0.10.

As compared with the preceding month of November, the pressures reduced to sea level show a rise in the Lake Region and especially in the Rocky Mountain Plateau Region; but a fall in Oregon, Washington, the Missouri Valley, and the Atlantic Coast, and especially in the Canadian Maritime and Northwest Provinces. The greatest rises were: El Paso, 0.15; Idaho Falls, 0.14; Salt Lake City, 0.13; Corpus Christi, Phœnix, Yuma, and Santa Fe, 0.12. The greatest falls were: Edmonton, 0.41; Calgary, 0.35; Battleford, 0.34; Prince Albert, Swift Current, and Banff, 0.29; Havre, 0.28; St. Johns, N. F., and Spences Bridge, 0.21.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month eight high areas and twelve low areas have merited attention. Charts II and I give the tracks of these conditions, together with the position of each at 8 a. m.

and 8 p. m., and the barometer reading at the center twice each day. It should be noted that while these tracks, especially of the high areas, seem to be well defined, oftentimes the centers can not be exactly ascertained, and the definite lines are sometimes misleading, as though indicating a steady advance of a condition which may be extremely erratic in its apparent movement. We shall obtain a very inadequate idea of the actual weather of the month by a study of these tracks or of the accompanying developments of the high and low areas. It is necessary to take a broader view and to determine whether there were general conditions governing the weather over large regions. It is rather remarkable that the temperature conditions of December were almost exactly reversed from those in November. In the extreme northwest in December we find almost the warmest month of the twenty-seven during which we have observations, while in November it was the coldest of the twenty-seven. If we compare the tracks of high areas in the two months (Chart II) we shall find them almost exactly identical. There is a slight difference, however, in that there was a subpermanent area of high pressure, December 17–23, in the central plateau which had no counterpart in November. On the South Atlantic Coast also the high areas will be found hovering over eastern Tennessee, Kentucky, and central and western North and South Carolina, instead of passing into the ocean as they did in November. A fuller discussion of this question will be found in "Special Contributions."

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	52	104	4 p. m.	43	63	2,590	3.5	739	30.8
*Ia	3, p. m.	38	78	7, a. m.	33	78	640*	3.5*	183*	7.6
II	5, p. m.	40	125	12, p. m.	31	79	3,430	7.0	490	20.4
III	12, p. m.	35	120	15, p. m.	30	99	1,720	3.0	574	23.9
IV	14, a. m.	50	85	18, p. m.	46	60	2,080	4.5	461	19.2
V	16, a. m.	53	115	20, a. m.	32	96	1,900	4.0	475	19.8
VI	23, a. m.	54	108	26, p. m.	31	89	2,880	3.5	823	34.3
VII	26, p. m.	48	80	31, a. m.	37	80	1,830	4.5	407	17.0
VIII	29, a. m.	52	119	31, p. m.	48	74	1,960	2.5	785	32.7
Total (omitting I*a*)							18,390	32.5	4,754	
Mean of 8 tracks									594	24.8
Mean of 32.5 days									566	23.6
Low areas.										
I	1, a. m.	48	127	5, a. m.	51	69	2,870	4.0	717	29.9
II	3, a. m.	50	124	7, a. m.	46	59	3,170	4.0	794	33.1
III	7, a. m.	55	115	10, p. m.	52	74	2,110	3.5	602	25.1
IV	8, a. m.	50	96	10, a. m.	47	54	2,330	2.0	1,164	48.5
V	9, p. m.	52	123	11, p. m.	46	86	1,780	2.0	890	37.1
VI	11, p. m.	53	103	14, p. m.	46	57	2,330	3.0	776	32.3
VII	11, p. m.	49	127	14, p. m.	50	100	1,280	3.0	426	17.7
VIII	13, a. m.	34	96	18, a. m.	48	55	2,650	5.0	530	22.1
IX	14, a. m.	46	127	19, p. m.	48	60	4,240	5.5	771	32.1
X	19, p. m.	50	116	23, a. m.	40	72	2,710	3.5	773	32.2
XI	24, a. m.	51	110	26, p. m.	49	56	2,570	2.5	1,030	42.9
XII	26, a. m.	47	126	31, a. m.	44	59	3,490	5.0	698	29.1
Total							31,530	43.0	9,171	
Mean of 12 tracks									764	31.8
Mean of 43 days									733	30.5

* Not included in averages.

HIGHS.

Nos. I, V, VI, and VIII were first noted to the north of Montana. Nos. II and III came in from off the central Pacific Coast, and Nos. IV and VII were first noted near Lake Superior. The paths are well distributed over the country. When No. I reached Virginia on the p. m. of the 3d it seems to have divided, a part going northeast to Nova Scotia, and another part hovering over Virginia and North Carolina; there was practically no motion in this offshoot, No. I*a*, and it has not been included in the general summary for the month.* These high areas were unaccompanied by any severe cold waves, though there was a fall of 24° to 28° over a limited area in northern Louisiana and northeast Texas when high area No. VI had reached Illinois on p. m. of the 24th. The absence of marked changes in temperature in the northwest was remarkable, as will be noted in another place.

LOWS.

Most of the lows in December were first noted off the north Pacific Coast or to the north of the State of Washington. The tracks are seen to be parallel and are located mostly along the northern border of the country, disappearing finally in the Gulf of St. Lawrence or off Nova Scotia. The month opened with a disturbance in the south-central Gulf of Mexico. The depression was very slight, and, though it crossed the middle of Florida on the a. m. of the 2d, its track was too ill defined and too short to be charted.

On the 2d the disturbance from the Gulf had moved to the Georgia coast, and caused a gale of 40 miles per hour at Charleston and of 50 miles at Hatteras.

As storm No. IV approached the Atlantic Coast it increased rapidly in energy. On the 9th, p. m., the pressure was 29.16 at Eastport, with winds west 52 miles at New York and southwest 48 miles at Woods Hole. The next morning, 10th, a. m., St. Johns, N. F., reported pressure 28.60 and wind north 40 miles per hour; p. m. of 9th Halifax reported rain 1.48 inch, and Sidney 1.04 in twelve hours; a. m. of 10th St. Johns reported 1.14 inch in twelve hours.

No. VIII began in northeast Texas on the a. m. of the 13th; its motion was east and northeast, most of the time beyond Weather Bureau stations. It was last noted, a. m. of the 18th, over Newfoundland.

As storm No. VIII was passing up the Atlantic Coast the severest winds of the month were experienced. On the 16th, p. m., the wind reached 62 miles per hour for five minutes at Nantucket, with an extreme velocity of 105 miles for one minute. At Greenwich, noon (7 a. m.), 16th, the storm is located by the Hydrographic Office about 380 miles southeast of New York City. The highest 5-minute velocity of the month, 80 miles per hour, was noted at Block Island p. m. of the 16th.

When the last low area of the month was passing into the Gulf of St. Lawrence the last high area had reached the region to the north of Lake Superior. The barometric gradients caused by this combination gave a maximum wind velocity at Sault Ste. Marie of 44 miles per hour, which was the highest December velocity, excepting 50 miles in 1890, experienced at this station.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

December, 1896, was on the whole a pleasant, sunshiny month. In a few localities severe and unseasonable weather prevailed for a short time, a notable exception being the severe snowstorm that covered Virginia, North and South Carolina, and Georgia on the 2d. Rain on the night of the 1st turned to sleet, and later to snow. As a result the trees, telegraph and telephone poles throughout South Carolina and Georgia were so heavily coated with ice that they broke under the great weight. Telegraphic communication with the outside world was interrupted for more than twenty-four hours over a considerable portion of Georgia and South Carolina. Electric light and fire alarm systems were also completely disabled.

The Atlantic Coast storm of the 17th was attended by high winds and snow on the New Jersey and New England coasts. Steamship traffic was delayed and railroad and street car lines were crippled throughout New England. The three-masted schooner *Ulrica* was wrecked on Nantasket Beach. Three persons were frozen to death in New York.